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EXAMINER	
MCLEAN, NEIL R	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/814,910	HUDSON, KEVIN R.	
	Examiner	Art Unit	
	Neil R. McLean	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5-11 and 14-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-2, 5-11, and 14-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 1-2, 5-11, and 14-26 are pending in this application.

Claims 1, 8, 10, 17, and 20 are amended.

Claim 26 is new.

Response to Arguments

2. Regarding Applicant's Argument:

"As recited in the last clause of claim 1, the colorant is delivered to overlapping regions of a print medium with passes performed according to the pass assignments to form the pattern. The pass assignments in this last clause of claim 1 refer to the number of pass assignments over which subsets of the data elements have been distributed. In contrast, in Rosen, **different colorants are delivered to a print medium in different passes**."

Examiner's Response:

Rosen discloses a Constraint controller 122 which is preferably provided with means for setting and adjusting one or more of the following parameters and constraints: ...**Number of colors printed in a single pass**...; (Column 4, lines 12-49). Note: Applicant's notation of Rosen's Figures 3A- 3D is just an example and is not an exclusive limitation of Rosen's disclosure. It is respectfully requested that, in preparing

responses, the applicant fully considers the references in its entirety as potentially teaching all or part of the claimed invention

3. Regarding Applicant's Argument:

"In addition, claim 8 recites that distributing the subsets of the data elements is performed without using any mask. This is in contrast to the subject matter of Rosen, which requires the use of masks.

Independent claim 17 also recites distributing print data without using any masks, and is therefore, also further allowable for the foregoing reason."

Examiner's Response:

Rosen does not disclose expressly distributing the subsets of the data elements without using any masks.

Shaked discloses distributing the subsets of the data elements without using any masks (The invention is not limited to the use of a dither matrix. ... See a patent application entitled "**Halftone Dithering With and Without Mask**" by Michael D. McGuire and Rodney Shaw, Serial No. 08/729,082, filed on Oct. 10, 1996 and **incorporated herein by reference** (halftoned binary images are produced from grayscale images by taking a region of pixels from the input image and computing thresholds for every pixel in the region such that locations of the thresholds close in value are as random as possible consistent with being anticorrelated; Column 4, line 63 - Column 5, line 9).

Shaked & Rosen are combinable because they are from the same field of image processing; e.g., both references disclose methods of constructing images or text from individual ink drops deposited on a printing medium. At the time of the invention, it

would have been obvious to a person of ordinary skill in the art to distribute print data without using any masks. The suggestion/motivation for doing so would be to improve print quality by increasing the color choices at each dot. The color choices have been increased by controlling the amount of ink deposited at each dot. Varying the amount of ink can control the intensity at each dot as disclosed by Shaked in the Summary of Invention. Therefore, it would have been obvious to combine Rosen's method and apparatus for incremental printing of images or text on print media with Shaked's method of dithering color images to obtain the invention as specified in order to reduce graininess and improve image quality.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 5-7, 9-10, 14-16, 19-20, and 22-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Rosen et al. (US 6,543,871) hereinafter 'Rosen'.

Regarding Claim 1: (Currently Amended)

Rosen discloses a method (The invention relates to methods and apparatus that construct images or text from individual ink drops deposited on a printing medium in a two-dimensional pixel array as disclosed in Column 1, lines 10-13) of printing with a flexible number of passes, comprising:

obtaining print data (Image source 110 provides image data to mask generator 120, preferably in the form of binary data such as a bit map, but alternatively in any suitable form capable of being received and processed by mask generator 120 as described in Column 3, lines 48-52.) having a content defined by data elements corresponding to a pattern of dots of a colorant (The invention has general applicability to various fields of use relating to printers, copiers, and facsimile machines, whether stand-alone or networked, or any other type of device which creates images or text by incremental deposition of **dots of colorant** on a recording medium as described in Column 12, lines 21-25);

determining if at least one constraint on distribution of the print data exists (**Constraint controller 122** may comprise a module of mask generator 120 software. Constraint controller 122 is preferably provided with means for **setting and adjusting one or more of the following parameters and constraints**: Page dimensions; Media type; Resolution; Mask dimensions; **Number of passes**; Pass minimum time; Pass density; Pass advance (number of rows to advance after each pass) Carriage velocity; Ink type; Ink drying time; Swath delay time; Swath overlap; Swath interleaving; Passes per swath; Unidirectional or bidirectional passes; Time period between inking of adjacent pixels; Horizontal, vertical and diagonal spacing of dots printed in a single pass, both within a mask and at boundaries where masks in a row abut each other; Maximum pen-firing frequency; Pen temperature; Number of colors printed in a single pass; Advancing and retracting a page for extended drying time between passes; Firing of individual nozzles of pens to spread use evenly as described in Column 4, lines 12-58.) so that forming the pattern in only one pass is precluded, and, if the at least one constraint exists, then:

(a) distributing subsets of the data elements, corresponding to interspersed sub-patterns of the pattern (FIG. 3a through FIG. 3d) of dots of the colorant (Rosen discloses a Constraint controller 122 which is preferably provided with means for setting and adjusting one or more of the following parameters and constraints: ...**Number of colors printed in a single pass**...; (Column 4, lines 12-49). Note:

Regarding Applicant's notation of Rosen's Figures 3A- 3D; this is just an example and is not an exclusive limitation of Rosen's disclosure) to a number of pass assignments (For an image to be printed in **four passes** using four colors (cyan, magenta, yellow and black.), the number and the subsets being determined by the content of the print data and the at least one constraint (Operator control and adjustment of these constraints allows total control and customization so that optimal masks can be generated for virtually any application, to accommodate any media type and any apparatus as described in Column 4, lines 50-58), and

(b) delivering the colorant to overlapping regions of a print medium with passes performed according to the pass assignments to form the pattern (Mask generator 120 receives image data from image source 110, generates masks from the image data using random numbers received from random number selector 121 and constraints from constraint controller 122, and sends the completed masks to printer 130 for printing on media.)

Regarding Claim 3: (Withdrawn)

Regarding Claim 4: (Withdrawn)

Regarding Claim 5: (Original)

Rosen further discloses the method of claim 1, wherein distributing is performed sequentially

to select and remove different subsets of the print data until at least substantially all of the data elements have been selected and removed (Table 1 sets forth only one example of the algorithm which accomplishes the method).

Regarding Claim 6: (Original)

Rosen further discloses the method of claim 1, wherein distributing is performed as a sequence of selections including a first selection and one or more subsequent selections, with

each selection creating one of the subsets of the print data and a remaining portion of the data elements, and wherein each subsequent selection is performed on the remaining portion that is present when each subsequent selection is initiated (Referring to Figure 2; At a step 207, check whether pass number currently selected satisfies constraints. If yes, store pass number currently selected in mask and repeat steps 204 through 207 for next column of this row. If no, repeat steps 204 through 207 until sequence of pass numbers is selected that satisfies constraints, skip step 208 and proceed to step 209. If all pass numbers have been attempted at all previous columns and no sequence can be found which satisfies constraints, proceed to step 208 as described in Column 6, lines 13-20).

Regarding Claim 7: (Original)

Rosen further discloses the method of claim 6, wherein creating the remaining portion for at

least one of the selections includes comparing the subset of the print data created by the at least one selection with a remaining portion of the print data present when the at least one selection was initiated (At a step 207, check whether pass number currently selected satisfies constraints. If yes, store pass number currently selected in mask and repeat steps 204 through 207 for next column of this row. If no, repeat steps 204 through 207 until sequence of pass numbers is selected that satisfies constraints, skip step 208 and proceed to step 209. If all pass numbers have been attempted at all previous columns and no sequence can be found which satisfies constraints, proceed to step 208 as described in Column 6, lines 21-29).

Regarding Claim 9: (Original)

Rosen further discloses the method of claim 1, wherein distributing is performed with an algorithm (Table 1 shows an embodiment of the algorithm which accomplishes the method set forth herein.)

Regarding Claim 10: (Currently Amended)

Rosen discloses the method of printing with a flexible number of passes, comprising:

obtaining print data (Image source 110 provides image data to mask generator 120, preferably in the form of binary data such as a bit map, but alternatively in any suitable form capable of being received and processed by mask generator 120 as described in Column 3, lines 48-52.) including data elements corresponding to a pattern of dots of a colorant included in a swath (The invention has general applicability to various fields of use relating to printers, copiers, and facsimile machines, whether stand-alone or networked, or any other type of device which creates images or text by incremental deposition of **dots of colorant** on a recording medium as described in Column 12, lines 21-25);

determining if at least one constraint on distribution of the print data exists (**Constraint controller 122** may comprise a module of mask generator 120 software. Constraint controller 122 is preferably provided with means for **setting and adjusting one or more of the following parameters and constraints**: Page dimensions; Media type; Resolution; Mask dimensions; **Number of passes**; Pass minimum time; Pass density; Pass advance (number of rows to advance after each pass) Carriage velocity; Ink type; Ink drying time; Swath delay time; Swath overlap; Swath interleaving; Passes per swath; Unidirectional or bidirectional passes; Time period between inking of adjacent pixels; Horizontal, vertical and diagonal spacing of dots printed in a single pass, both within a mask and at boundaries where masks in a row abut each other; Maximum pen-firing frequency; Pen temperature; Number of colors printed in a single pass; Advancing and retracting a page for extended drying time between passes; Firing of individual nozzles of pens to spread use evenly as described in Column 4, lines 12-58.) so that forming the pattern of dots of the colorant (Rosen discloses a Constraint controller 122 which

is preferably provided with means for setting and adjusting one or more of the following parameters and constraints: ...**Number of colors printed in a single pass**...; (Column 4, lines 12-49). Note: Regarding Applicant's notation of Rosen's Figures 3A- 3D; this is just an example and is not an exclusive limitation of Rosen's disclosure) in only one pass is precluded, and, if the at least one constraint exists, then:

(a) distributing subsets of the data elements with an algorithm to a minimum number of pass assignments permitted by the at least one constraint and the print data, the subsets corresponding to interspersed sub-patterns of the pattern of dots of the colorant (Rosen discloses a Constraint controller 122 which is preferably provided with means for setting and adjusting one or more of the following parameters and constraints: ...**Number of colors printed in a single pass**...; (Column 4, lines 12-49). Note: Regarding Applicant's notation of Rosen's Figures 3A- 3D; this is just an example and is not an exclusive limitation of Rosen's disclosure), and

(b) delivering the colorant to overlapping regions of a print medium with a minimum number of passes corresponding to the minimum number of pass assignments to form the pattern (Mask generator 120 receives image data from image source 110, generates masks from the image data using random numbers received from random number selector 121 and constraints from constraint controller 122, and sends the completed masks to printer 130 for printing on media.)

Regarding Claim 12: (Withdrawn)

Regarding Claim 13: (Withdrawn)

Regarding Claim 14: (Original)

Rosen discloses the method of claim 10, wherein distributing is performed sequentially by the algorithm to select and nullify the subsets of the print data until at

least substantially all of the data elements have been selected and nullified (Table 1 sets forth only one example of the algorithm which accomplishes the method).

Regarding Claim 15: (Original)

Rosen discloses the method of claim 10, wherein distributing is performed by the algorithm as a sequence of selections including a first selection and one or more subsequent selections, with each selection creating one of the subsets of the print data and a remaining portion of the data elements, and wherein each subsequent selection is performed by the algorithm on the remaining portion that is present when each subsequent selection is initiated (Referring to Figure 2; At a step 207, check whether pass number currently selected satisfies constraints. If yes, store pass number currently selected in mask and repeat steps 204 through 207 for next column of this row. If no, repeat steps 204 through 207 until sequence of pass numbers is selected that satisfies constraints, skip step 208 and proceed to step 209. If all pass numbers have been attempted at all previous columns and no sequence can be found which satisfies constraints, proceed to step 208 as described in Column 6, lines 13-20).

Regarding Claim 16: (Original)

Rosen discloses the method of claim 15, wherein creating the remaining portion for at least one of the selections includes comparing the subset created by the at least one selection with a remaining portion of the print data present when the at least one selection was initiated (At a step 207, check whether pass number currently selected satisfies constraints. If yes, store pass number currently selected in mask and repeat steps 204 through 207 for next column of this row. If no, repeat steps 204 through 207 until sequence of pass numbers is selected that satisfies constraints, skip step 208

and proceed to step 209. If all pass numbers have been attempted at all previous columns and no sequence can be found which satisfies constraints, proceed to step 208 as described in Column 6, lines 21-29).

Regarding Claim 19: (Original)

Rosen discloses the program storage device readable by a processor, tangibly embodying a program of instructions executable by the processor to perform a method of printing with a flexible number of passes, the method comprising:

obtaining print data (Image source 110 provides image data to mask generator 120, preferably in the form of binary data such as a bit map, but alternatively in any suitable form capable of being received and processed by mask generator 120 as described in Column 3, lines 48-52.) having a content defined by data elements corresponding to a pattern of dots of a colorant (The invention has general applicability to various fields of use relating to printers, copiers, and facsimile machines, whether stand-alone or networked, or any other type of device which creates images or text by incremental deposition of **dots of colorant** on a recording medium as described in Column 12, lines 21-25);

determining if at least one constraint on distribution of the print data exists (**Constraint controller 122** may comprise a module of mask generator 120 software. Constraint controller 122 is preferably provided with means for **setting and adjusting one or more of the following parameters and constraints**: Page dimensions; Media type; Resolution; Mask dimensions; **Number of passes**; Pass minimum time; Pass density; Pass advance (number of rows to advance after each pass) Carriage velocity; Ink type; Ink drying time; Swath delay time; Swath overlap; Swath interleaving; Passes per swath; Unidirectional or bidirectional passes; Time period between inking of adjacent pixels; Horizontal, vertical and diagonal spacing of dots printed in a single pass, both within a mask and at boundaries where masks in a row abut each other; Maximum pen-firing frequency; Pen temperature; Number of colors printed in a single pass; Advancing and retracting a page for extended drying time between passes; Firing of individual nozzles of pens to spread use evenly as described in Column 4, lines 12-58.)

so that forming the pattern in only one pass is precluded, and, if the at least one constraint exists, then:

(a) distributing subsets of the data elements, corresponding to interspersed sub-patterns of the pattern, to a number of pass assignments, the number and the subsets being determined by the content of the print data and the at least one constraint (Operator control and adjustment of these constraints allows total control and customization so that optimal masks can be generated for virtually any application, to accommodate any media type and any apparatus as described in Column 4, lines 50-58), and

(b) delivering the colorant to overlapping regions of a print medium with passes performed according to the pass assignments to form the pattern (Constraint controller 122 **controls passes per swath** as described in Column 4, lines 33-36).

Regarding Claim 20: (Original)

Rosen discloses the apparatus for printing with a flexible number of passes, comprising:

a controller configured to obtain print data (Image source 110 provides image data to mask generator 120, preferably in the form of binary data such as a bit map, but alternatively in any suitable form capable of being received and processed by mask generator 120 as described in Column 3, lines 48-52.) having a content defined by data elements corresponding to a pattern of dots of a colorant (The invention has general applicability to various fields of use relating to printers, copiers, and facsimile machines, whether stand-alone or networked, or any other type of device which creates images or text by incremental deposition of **dots of colorant** on a recording medium as described in Column 12, lines 21-25) and also configured to determine if at least one constraint on distribution of the print data exists (**Constraint controller 122** may comprise a module of mask generator 120 software. Constraint controller 122 is

preferably provided with means for **setting and adjusting one or more of the following parameters and constraints**: Page dimensions; Media type; Resolution; Mask dimensions; **Number of passes**: Pass minimum time; Pass density; Pass advance (number of rows to advance after each pass) Carriage velocity; Ink type; Ink drying time; Swath delay time; Swath overlap; Swath interleaving; Passes per swath; Unidirectional or bidirectional passes; Time period between inking of adjacent pixels; Horizontal, vertical and diagonal spacing of dots printed in a single pass, both within a mask and at boundaries where masks in a row abut each other; Maximum pen-firing frequency; Pen temperature; Number of colors printed in a single pass; Advancing and retracting a page for extended drying time between passes; Firing of individual nozzles of pens to spread use evenly as described in Column 4, lines 12-58.) so that forming the pattern in only one pass is precluded, the controller including a data distribution mechanism configured, if the at least one constraint exists, to distribute subsets of the data elements, corresponding to interspersed sub-patterns of the pattern, to a number of pass assignments, the number and the subsets being determined by the content of the print data and the at least one constraint (Operator control and adjustment of these constraints allows total control and customization so that optimal masks can be generated for virtually any application, to accommodate any media type and any apparatus as described in Column 4, lines 50-58) so that the pattern of dots will be formed on overlapping regions of a print medium with passes performed according to the pass assignments.

Regarding Claim 22: (Original)

Rosen discloses the system for printing with a flexible number of passes, comprising:

a controller configured to obtain print data (Image source 110 provides image data to mask generator 120, preferably in the form of binary data such as a bit map, but alternatively in any suitable form capable of being received and processed by mask generator 120 as described in Column 3, lines 48-52.) having a content defined by data elements corresponding to a pattern of dots of a colorant (The

invention has general applicability to various fields of use relating to printers, copiers, and facsimile machines, whether stand-alone or networked, or any other type of device which creates images or text by incremental deposition of **dots of colorant** on a recording medium as described in Column 12, lines 21-25) and also configured to determine if at least one constraint on distribution of the print data exists (**Constraint controller 122** may comprise a module of mask generator 120 software. Constraint controller 122 is preferably provided with means for **setting and adjusting one or more of the following parameters and constraints**: Page dimensions; Media type; Resolution; Mask dimensions; **Number of passes**; Pass minimum time; Pass density; Pass advance (number of rows to advance after each pass) Carriage velocity; Ink type; Ink drying time; Swath delay time; Swath overlap; Swath interleaving; Passes per swath; Unidirectional or bidirectional passes; Time period between inking of adjacent pixels; Horizontal, vertical and diagonal spacing of dots printed in a single pass, both within a mask and at boundaries where masks in a row abut each other; Maximum pen-firing frequency; Pen temperature; Number of colors printed in a single pass; Advancing and retracting a page for extended drying time between passes; Firing of individual nozzles of pens to spread use evenly as described in Column 4, lines 12-58.) so that forming the pattern in only one pass is precluded, the controller including a data distribution mechanism configured, if the at least one constraint exists, to distribute subsets of the data elements, corresponding to interspersed sub- patterns of the pattern, to a number of pass assignments, the number and the subsets being determined by the content of the print data and the at least one constraint (Operator control and adjustment of these constraints allows total control and customization so that optimal masks can be generated for virtually any application, to accommodate any media type and any apparatus as described in Column 4, lines 50-58); and

one or more image forming devices configured to deliver the colorant to the overlapping regions of a print medium with a plurality of passes corresponding to the number of pass assignments to form the pattern of dots (Constraint controller 122 **controls passes per swath** as described in Column 4, lines 33-36).

Regarding Claim 23: (Original)

Rosen discloses the system of claim 22, wherein the one or more image forming devices include one or more printheads (Constraint controller 122 is preferably provided with means for setting and adjusting one or more of the following parameters and constraints: Firing of individual nozzles **of pens** to spread use evenly is disclosed).

Regarding Claim 24: (Original)

Rosen discloses the system for printing with a flexible number of passes, comprising:

means for obtaining print data (Image source 110 provides image data to mask generator 120, preferably in the form of binary data such as a bit map, but alternatively in any suitable form capable of being received and processed by mask generator 120 as described in Column 3, lines 48-52.) having a content defined by data elements corresponding to a pattern of dots of a colorant (The invention has general applicability to various fields of use relating to printers, copiers, and facsimile machines, whether stand-alone or networked, or any other type of device which creates images or text by incremental deposition of **dots of colorant** on a recording medium as described in Column 12, lines 21-25);

means for determining if at least one constraint on distribution of the print data exists so that forming the pattern in only one pass is precluded (**Constraint controller 122** may comprise a module of mask generator 120 software. Constraint controller 122 is preferably provided with means for **setting and adjusting one or more of the following parameters and constraints**: Page dimensions; Media type; Resolution; Mask dimensions; **Number of passes**; Pass minimum time; Pass density; Pass advance (number of rows to advance after each pass) Carriage velocity; Ink type; Ink drying time; Swath delay time; Swath overlap; Swath interleaving; Passes per swath; Unidirectional or bidirectional passes; Time period between inking of adjacent pixels; Horizontal, vertical and diagonal spacing of dots printed in a single pass, both within a mask and at boundaries where masks in a row abut each other; Maximum pen-firing frequency; Pen temperature; Number of colors printed in a

single pass; Advancing and retracting a page for extended drying time between passes; Firing of individual nozzles of pens to spread use evenly as described in Column 4, lines 12-58.);

means for distributing, if the at least one constraint exists, subsets of the data elements, corresponding to interspersed sub-patterns of the pattern, to a number of pass assignments, the number of pass assignments, the number and subsets being determined by the content of the print data and the at least one constraint (Operator control and adjustment of these constraints allows total control and customization so that optimal masks can be generated for virtually any application, to accommodate any media type and any apparatus as described in Column 4, lines 50-58); and

means for delivering the colorant to overlapping regions of a print medium with passes performed according to the pass assignments to form the pattern (Constraint controller 122 **controls passes per swath** as described in Column 4, lines 33-36).

Regarding Claim 25: (Original)

Rosen discloses the method of printing with a flexible number of passes, comprising:

a step for obtaining print data (Image source 110 provides image data to mask generator 120, preferably in the form of binary data such as a bit map, but alternatively in any suitable form capable of being received and processed by mask generator 120 as described in Column 3, lines 48-52.) having a content defined by data elements corresponding to a pattern of dots of a colorant (The invention has general applicability to various fields of use relating to printers, copiers, and facsimile machines, whether stand-alone or networked, or any other type of device which creates images or text by incremental deposition of **dots of colorant** on a recording medium as described in Column 12, lines 21-25);

a step for determining if at least one constraint on distribution of the print data exists so that forming the pattern in only one pass is precluded, and, if the at least one constraint exists (**Constraint controller 122** may comprise a module of mask generator 120 software. Constraint controller 122 is preferably provided with means for **setting and adjusting one or more of the following parameters and constraints**: Page dimensions; Media type; Resolution; Mask dimensions; **Number of passes**; Pass minimum time; Pass density; Pass advance (number of rows to advance after each pass) Carriage velocity; Ink type; Ink drying time; Swath delay time; Swath overlap; Swath interleaving; Passes per swath; Unidirectional or bidirectional passes; Time period between inking of adjacent pixels; Horizontal, vertical and diagonal spacing of dots printed in a single pass, both within a mask and at boundaries where masks in a row abut each other; Maximum pen-firing frequency; Pen temperature; Number of colors printed in a single pass; Advancing and retracting a page for extended drying time between passes; Firing of individual nozzles of pens to spread use evenly as described in Column 4, lines 12-58.), then:

(a) a step for distributing subsets of the data elements, corresponding to interspersed sub-patterns of the pattern, to a number of pass assignments, the number and the subsets being determined by the content of the print data and the at least one constraint (Operator control and adjustment of these constraints allows total control and customization so that optimal masks can be generated for virtually any application, to accommodate any media type and any apparatus as described in Column 4, lines 50-58), and

(b) a step for delivering the colorant to overlapping regions of a print medium with passes performed according to the pass assignments to form the pattern (Constraint controller 122 **controls passes per swath** as described in Column 4, lines 33-36).

Regarding Claims 26: (New)

Rosen discloses the method of claim 1, wherein delivering the colorant comprises delivering a single colorant to overlapping regions of the print medium with

the passes performed according to the pass assignments, wherein the single colorant is one colorant from among plural colorants that are present in the print data (Rosen discloses a Constraint controller 122 which is preferably provided with means for setting and adjusting one or more of the following parameters and constraints: ...**Number of colors printed in a single pass**...; (Column 4, lines 12-49). Note: Applicant's notation of Rosen's Figures 3A- 3D is just an example and is not an exclusive limitation of Rosen's disclosure.)

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 2 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosen et al. (US 6,543,871), hereinafter 'Rosen', as applied to claim 1 and 10 above, and further in view of Abe (US 7,330,291).

Regarding Claim 2 and similar Claim 11: (Original)

Rosen teaches all features of the invention in Claim 1 and 10 but does not disclose expressly wherein obtaining print data includes receiving a contone form of the print data and converting the contone form to a halftone form of the print data.

Abe discloses wherein obtaining print data includes receiving a contone form of the print data and converting the contone form to a halftone form of the print data (FIG. 2

is a block diagram, illustrating the concepts of the process of **converting a continuous-tone image into a halftone image** using a dither mask. That is, image conversion device 20 has a function of performing a process of converting the continuous-tone image 100, provided as the original image, into a halftone image (pseudo-tone image) 200. This conversion process is basically a process wherein the pixel value P of each pixel that makes up continuous-tone image 100 is compared with a predetermined threshold and is converted into a new pixel value Q=0 or Q=1 in accordance with the relationship of magnitude, and image conversion device 20 functions as a threshold processing device as described in Column 12, line 65 – Column 13, line 8).

Abe & Rosen are combinable because they are from the same field of endeavor of image processing; e.g., both references disclose methods of printing by means of ejecting ink droplets.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to convert a contone form to a halftone form

The suggestion/motivation for doing so would be to improve the quality of e.g., gray scale information of continuous tones. Abe discloses that in ordinary offset printing, that one cannot use a plurality of types of inks that differ in concentration of gray scale information. Abe further discloses that a continuous-tone image, which has been given as an original image, is converted into a halftone image, results in a high-quality halftone image as disclosed in Abe's Background of Art.

Therefore, it would have been obvious to combine Abe's conversion of a contone image into a halftone image feature with Rosen's apparatus that construct images from individual ink drops deposited on a printing medium to obtain the invention as specified in Claim 2 and Claim 11 in order to optimize quality, throughput speed and reliability.

8. Claims 8, 17-18 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosen et al. (US 6,543,871) hereinafter 'Rosen', in view of Shaked et al. (US 6,600,573) hereinafter 'Shaked'.

Regarding Claim 8: (Currently Amended)

Rosen does not disclose expressly distributing the subsets of the data elements without using any masks.

Shaked discloses distributing the subsets of the data elements without using any masks (The invention is not limited to the use of a dither matrix. ... See a patent application entitled "**Halftone Dithering With and Without Mask**" by Michael D. McGuire and Rodney Shaw, Serial No. 08/729,082, filed on Oct. 10, 1996 and **incorporated herein by reference** (halftoned binary images are produced from grayscale images by taking a region of pixels from the input image and computing thresholds for every pixel in the region such that locations of the thresholds close in value are as random as possible consistent with being anticorrelated; Column 4, line 63 - Column 5, line 9).

Shaked & Rosen are combinable because they are from the same field of image processing; e.g., both references disclose methods of constructing images or text from individual ink drops deposited on a printing medium. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to distribute print data without using any masks. The suggestion/motivation for doing so would be to improve print quality by increasing the color choices at each dot. The color choices have been increased by controlling the amount of ink deposited at each dot. Varying the amount of ink can control the intensity at each dot as disclosed by Shaked in the Summary of Invention. Therefore, it would have been obvious to combine Rosen's method and

apparatus for incremental printing of images or text on print media with Shaked's method of dithering color images to obtain the invention as specified in order to reduce graininess and improve image quality.

Regarding Claim 17: (Original)

Rosen discloses the method of printing with a flexible number of passes, comprising:

obtaining print data (Image source 110 provides image data to mask generator 120, preferably in the form of binary data such as a bit map, but alternatively in any suitable form capable of being received and processed by mask generator 120 as described in Column 3, lines 48-52.) corresponding to a pattern of dots of a colorant disposed at a subset of positions within an array (The invention has general applicability to various fields of use relating to printers, copiers, and facsimile machines, whether stand-alone or networked, or any other type of device which creates images or text by incremental deposition of **dots of colorant** on a recording medium as described in Column 12, lines 21-25);

obtaining at least one constraint limiting distribution of the print data and defining a minimum number of passes for permitted delivery of the colorant to at least substantially all of the positions of the array (**Constraint controller 122** may comprise a module of mask generator 120 software. Constraint controller 122 is preferably provided with means for **setting and adjusting one or more of the following parameters and constraints**: Page dimensions; Media type; Resolution; Mask dimensions; **Number of passes**; Pass minimum time; Pass density; Pass advance (number of rows to advance after each pass) Carriage velocity; Ink type; Ink drying time; Swath delay time; Swath overlap; Swath interleaving; Passes per swath; Unidirectional or bidirectional passes; Time period between inking of adjacent pixels; Horizontal, vertical and diagonal spacing of dots printed in a single pass, both within a mask and at boundaries where masks in a row abut each other; Maximum pen-firing frequency; Pen temperature; Number of colors printed in a single pass;

Advancing and retracting a page for extended drying time between passes; Firing of individual nozzles of pens to spread use evenly as described in Column 4, lines 12-58.);

distributing the print data to a plurality of pass assignments corresponding to interspersed sub-patterns of the pattern, the number of pass assignments being less than the minimum number; and

delivering the colorant to overlapping regions of a print medium according to the plurality of pass assignments with a corresponding plurality of passes to form the pattern (Constraint controller 122 **controls passes per swath** as described in Column 4, lines 33-36).

Rosen does not disclose expressly distributing the subsets of the data elements without using any masks.

Shaked discloses distributing the subsets of the data elements without using any masks (The invention is not limited to the use of a dither matrix. ... See a patent application entitled "**Halftone Dithering With and Without Mask**" by Michael D. McGuire and Rodney Shaw, Serial No. 08/729,082, filed on Oct. 10, 1996 and **incorporated herein by reference** (halftoned binary images are produced from grayscale images by taking a region of pixels from the input image and computing thresholds for every pixel in the region such that locations of the thresholds close in value are as random as possible consistent with being anticorrelated; Column 4, line 63 - Column 5, line 9).

Shaked & Rosen are combinable because they are from the same field of image processing; e.g., both references disclose methods of constructing images or text from individual ink drops deposited on a printing medium. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to distribute print data without using any masks. The suggestion/motivation for doing so would be to improve print quality by increasing the color choices at each dot. The color choices have been

increased by controlling the amount of ink deposited at each dot. Varying the amount of ink can control the intensity at each dot as disclosed by Shaked in the Summary of Invention. Therefore, it would have been obvious to combine Rosen's method and apparatus for incremental printing of images or text on print media with Shaked's method of dithering color images to obtain the invention as specified in order to reduce graininess and improve image quality.

Regarding Claim 18: (Original)

Rosen further discloses the method of claim 17, wherein distributing is performed so that the number of pass assignments is configured to be a minimum permitted by the print data and the at least one constraint (Operator control and adjustment of these constraints allows total control and customization so that optimal masks can be generated for virtually any application, to accommodate any media type and any apparatus as described in Column 4, lines 50-58).

Regarding Claim 21: (Original)

Rosen discloses the apparatus of claim 20, wherein the data distribution mechanism includes an algorithm (Table 1 sets forth only one example of the algorithm which accomplishes the method).

Rosen does not disclose expressly distributing the subsets of the data elements without using any masks.

Shaked discloses distributing the subsets of the data elements without using any masks (The invention is not limited to the use of a dither matrix. ... See a patent application entitled "**Halftone Dithering With and Without Mask**" by Michael D. McGuire and Rodney Shaw, Serial No. 08/729,082, filed on Oct.

10, 1996 and **incorporated herein by reference** (halftoned binary images are produced from grayscale images by taking a region of pixels from the input image and computing thresholds for every pixel in the region such that locations of the thresholds close in value are as random as possible consistent with being anticorrelated; Column 4, line 63 - Column 5, line 9).

Shaked & Rosen are combinable because they are from the same field of image processing; e.g., both references disclose methods of constructing images or text from individual ink drops deposited on a printing medium. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to distribute print data without using any masks. The suggestion/motivation for doing so would be to improve print quality by increasing the color choices at each dot. The color choices have been increased by controlling the amount of ink deposited at each dot. Varying the amount of ink can control the intensity at each dot as disclosed by Shaked in the Summary of Invention. Therefore, it would have been obvious to combine Rosen's method and apparatus for incremental printing of images or text on print media with Shaked's method of dithering color images to obtain the invention as specified in order to reduce graininess and improve image quality.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fujimori (US 2003/0007024) discloses a printing technique for printing by means of ejecting ink droplets.

Examiner Notes

10. The Examiner cites particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested that, in preparing responses, the applicant fully considers the references in its entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or as disclosed by the Examiner.

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Neil R. McLean whose telephone number is (571)270-1679. The examiner can normally be reached on Monday through Friday 7:30AM-4:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be reached on 571.272.7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Neil R. McLean/
Examiner, Art Unit 2625

/David K Moore/
Supervisory Patent Examiner, Art Unit 2625